

**BUILDING GAME “MABISH : SMART RUBBISH”
(EDUCATION GAME FOR THE HANDLING OF RUBBISH)**



**This Final Project Compiled as a Condition to Complete Bachelor Degree Program at
Department of Informatics Faculty of Communication and Informatics**

Submitted by:

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**DEPARTMENT OF INFORMATICS
FACULTY OF COMMUNICATION AND INFORMATICS
UNIVERSITAS MUHAMMADIYAH SURAKARTA**

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APPROVAL PAGE

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SCIENTIFIC PUBLICATION

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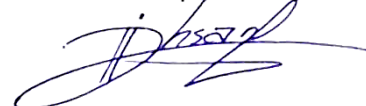
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BUILDING GAME "MABISH : SMART RUBBISH" (EDUCATION GAME FOR THE HANDLING OF RUBBISH)

Abstract

Rubbish is the unwanted leftover materials or used items from a process. Rubbish is also an object that will be found many surroundings around. In this case the waste management is so important to know, because errors in waste management can result in considerable losses. Although the Government has set things related to rubbish. However, these things have not been socialization well to the society. Many people still do not know the type of rubbish and the meaning of the colors of the rubbish bin that has been available in various city parks or public places and would not know how to manage such waste. The goal of the research is to the socialization of the regulation of the Minister of public works and help the public to know the things pertaining to the rubbish with fun through educational games. The game is based on desktop and also use the software in the form of construct 2 to make it. The game in desktop base for easy socialization by installation in public or school facilities. This game is called mabish or smart rubbish because in addition to the game there are also socializing regulation Ministerial as well as helpful tips for managing junk based on type. Research on testing techniques in the form of the addition of knowledge on rubbish and currency of the society against the game.

Keywords : *construct 2, desktop, educational games, mabish, rubbish.*

1. INTRODUCTION

Keep clean by disposing of rubbish it into place is of course very important. But there was rubbish

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BUILDING GAME “MABISH : SMART RUBBISH” (EDUCATION GAME FOR THE HANDLING OF RUBBISH)

Abstract

Rubbish is the unwanted leftover materials or used items from a process. Rubbish is also an object that will be found many surroundings around. In this case the waste management is so important to know, because errors in waste management can result in considerable losses. Although the Government has set things related to rubbish. However, these things have not been socialization well to the society. Many people still do not know the type of rubbish and the meaning of the colors of the rubbish bin that has been available in various city parks or public places and would not know how to manage such waste. The goal of the research is to the socialization of the regulation of the Minister of public works and help the public to know the things pertaining to the rubbish with fun through educational games. The game is based on desktop and also use the software in the form of construct 2 to make it. The game in desktop base for easy socialization by installation in public or school facilities. This game is called mabish or smart rubbish because in addition to the game there are also socializing regulation Ministerial as well as helpful tips for managing junk based on type. Research on testing techniques in the form of the addition of knowledge on rubbish and currency of the society against the game.

Keywords : *construct 2, desktop, educational games, mabish, rubbish.*

1. INTRODUCTION

Keep clean by disposing of rubbish it into place is of course very important. But throw away rubbish in its place in accordance with its type is also important, in order to later dump this rubbish can be processed again or do actions that should be. Disposal of waste into the wrong place can also be dangerous, and at risk of pollution of the soil as well as others. In this case the Government has been aiming at ways to rubbish handling is good. One of them is that there is in the regulation of the Minister of public works (PERMEN PU) number: 03/PRT/M/2013 that there are 5 kinds of rubbish are differentiated based on the type of rubbish that exists, namely the dangerous waste, rubbish, rubbish susceptible to repeated, waste recycling, waste and residue that every place the rubbish are distinguished by the color that is red, green, yellow, blue, and gray. However, not many people in General who know to five types of bins and how to dispose of rubbish should be.

Software game is a kind of application that is used not only for entertainment, but also for serious purposes that can be applicable to different domains such as education, business, and health care (Aleem, Capretz, & Ahmed, 2016). By means of technology now, education can be made without high cost the example used game application in the computer where in this era computer is not rare thing (Ardianto, & Fadlilah, 2016). Then, these Mabish such educational game not only for entertainment were underway in addition to disseminating government program as well so that the community can manipulate the rubbish properly. In this community will be invited to identify

five types of rubbish this and also how to handle each type of rubbish with fun. This game will be different from game dump the others due to be introduced this type of rubbish, the kind of rubbish, and handling for each type of waste. Mabish are an educational games that like (Sudiatmika, Cahyawan,& Buana, 2014) says Educational games are games that are designed or created to stimulate the intellect including improving concentration and solve the problem. Educational Games are one of the media types used to provide instruction, increase the knowledge of its users through a unique and compelling media. By the material rubbish knowledge and minimalist design such as that being schooled trend right now. So, the community will get education regarding rubbish with simple and fun.

2. METHOD

Research on classified research on applicative because in it there is media of learning for the community and also as a medium of dissemination of the regulation which is owned by the Minister and in this case the shape of the game. The study was compiled using (Adiwikarta,& Dirgantara, 2017) the method of Game Development Life Cycle (GDLC) which consists of several stages, namely requirements initiation, pre-production, production, testing, beta, release. Overview of the method in this research are reflected in Figure 1.

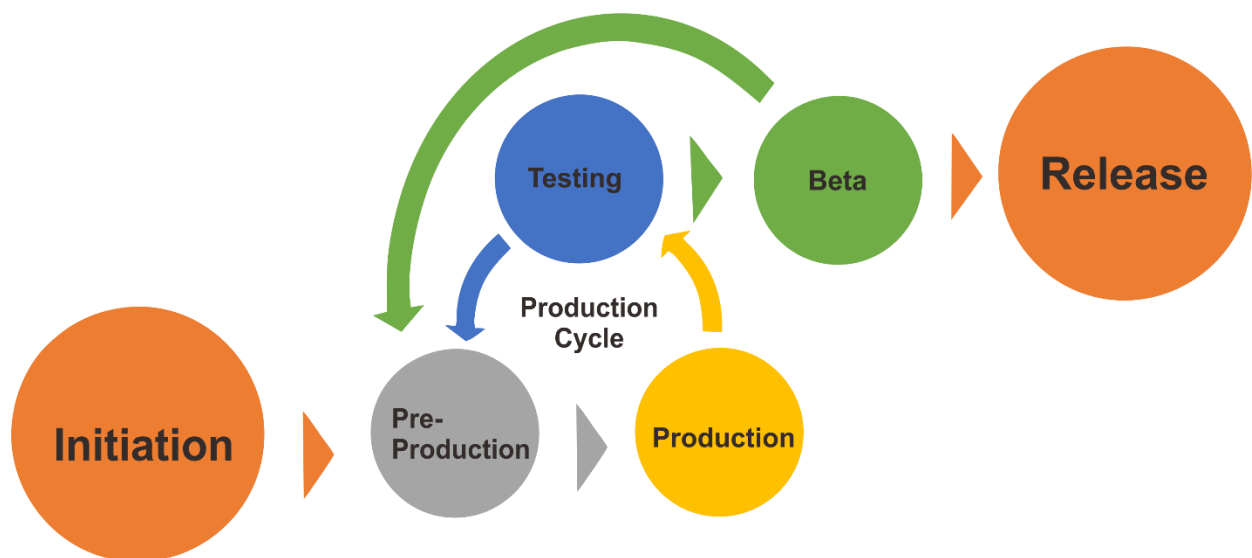


Figure 1. Methodology Game Development Life Cycle

a. Initiation

This is the initial stage of the developer that is started from the idea of the game. Session where developers think, brainstorming, as well as discussions about the idea of gaming and what games will be made.

In this case the developers had the idea of making games about rubbish, because seeing Government regulations as well as the regulations have not been socialized well. All of the rubbish bin basic on five color has applicable in public area but little bit society know about that. In addition, because of the importance of waste management.



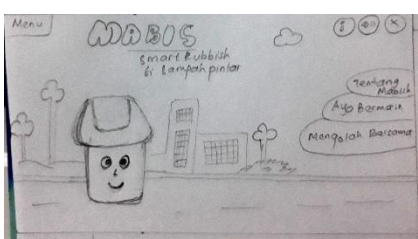
Figure 2. Rubbish bin in public area (Jatim Park 2)

b. Pre-Production

This stage begins with the storyboarded, determine the design that will be used to ripen and the concept of the game.

This game will be made up of three main menu or things, the first is the introduction the ministerial decree from ministry of public works related about the types of bins and bins of this type only in the form of information. The second will contain the game relating to waste disposal, there are three types of games that can be played that first game that is collecting and disposing of rubbish to the rubbish bin match type, catching the rubbish that fall from the sky in accordance with existing rubbish bin, and the Smart quiz. The third describes how the handling of rubbish, namely how to utilize, process or follow up the rubbish, this section describes information, pictures and also the consequences of not paying attention to the type of rubbish bin and the type of rubbish.

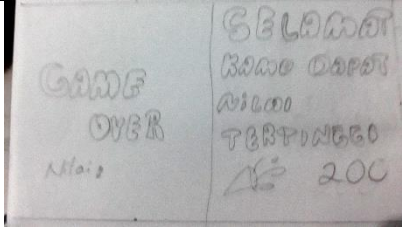
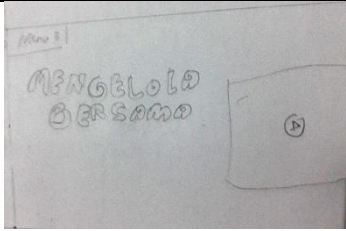
Tabel 1. The Story Board

No.	Layout	Name of Layout	Description
1.		Main Menu	This menus tell about the three menus of the game and can make people go to other layout. There are menu for exit, sound, and credits of the application.

Tabel 1. The Story Board

No.	Layout	Name of Layout	Description
2.		TM <i>Tentang Aku</i> (Mabish) About Me	The scene is one of three menus in the application and tell about the law of rubbish, kind of rubbish, and kind of rubbish bin.
3.		AB <i>Ayo Bermain</i> (Let's Play)	The second menu, contain of three games, and there are button for help and reset the score cause every game finished by high score
4.		Throwing rubbish	The first game, people must put the rubbish and throw into right rubbish bin in one minute and get the high score.
5.		Catching Rubbish	The second game, people must catch the rubbish basic in color of rubbish bin.
6.		Rubbish Quiz	The third or the last, people must choose the right answer.
7.		Help	Menu of help, telling people about the game that it must finishing in one minute, how to play the game, and get the high score.
8.		Time's Out	Time's out, tell about if one minute has end and you can play again or go to menu

Tabel 1. The Story Board

No.	Layout	Name of Layout	Description
9.		Game Over	Game over tell that the game is over and scene congratulation when get the high score
10.		MB <i>Mengelola Bersama</i> (Rubbish management)	The third menu or last menu that education people for handle many kind of rubbish.

c. Production

This stage has focused on translating the design of game design, concept art, and other aspects of aspects into constituent elements of the game. This phase deals with the asset creation, programming and integration between asset and source code.

This game used some hardware and software for build this game and run it. Some of the hardware and software are :

Tabel 2. The Hardware and Software used for create and run Mabish

Hardware	Software
<ul style="list-style-type: none"> Laptop Acer aspire e1-471, Intel processor ® core i3™ i3-2348M CPU @2.30GHz, RAM 6GB. 	<ul style="list-style-type: none"> Windows 10 Home 64 Bit Construct2 r240 NW.js for Construct 2 Firefox Quantum 57.0.4 (64-bit) Corel Draw X7 Prezi 5.2.8 MP3 converter 4.0

For create the game used Construct 2. CONSTRUCT 2 is an HTML5 based two dimensional (2D) game editor which allows quick creation of games in a drag-and-drop fashion using a graphical editor and a behavior -based logic system (Alom, Scoular, & Awwal, 2016).

For created presentation videos in third menu of the game used Prezi. Prezi is a web-based presentation tool that also allows the users to integrate multimedia features (Dano, &

Hinosolango, 2015). Prezi was developed in 2009 to address the perceived limitations of existing presentation tools. Presentations of Prezi are designed on an unlimited two-dimensional space without using a series of slides. Visual or verbal elements placed on the canvas can be brought together or separated from each other and can be rotated around themselves at the desired angle depending on the user's design (Akgun, Babur,& Albayrak,2016).

For design the game used CorelDraw X7 that is application vector graphics editor developed and marketed by Corel Corporation that have many feature and easy to use.

d. Testing

The stage is testing against the prototype build. Like (Mustaqbal, Firdaus, & Rahmadi, 2015) says Testing is a process of implementation of the program with the goal of finding an error. A good test case is when the test has the possibility to find a mistake that is not revealed. A test that success is the test when unpacking a mistake that was not originally found. This testing is performed by an internal developer did a usability test and functionality test.

In this stage the game is going to be tested by developer and to be evaluated properly. The tested that used is black box test.

e. Beta

When the game is not yet completed, meaning the game will be accepted by the masses. External testing, known as the beta testing is done to test the currency of the game and to detect various errors and complaints being thrown by third party tester. Beta is outside the production cycle, but the results of testing this potentially causes the developer repeats the production cycle again.

At this stage the game is going to be tested or used in the general public for the currency of the game itself.

f. Release

The stage where the game already completed and passed the beta testing indicates the game is ready to be released to the public. The final stages where release is builds from the official games released. After all steps of the game will be released and can access in public facilities.

3. RESULTS AND DISCUSSION

3.1 Asset

In this case the first create are assets. There are many assets for this game, from asset background for menu and others. Asset rubbish bin for three games in Mabish that have five color and two shape. Blank background for time's out and game over layout. Button for the facilities of the

Mabish application. Rubbish asset that used for socialization and object playing in the game. Timer indicator that have two color that means the red color will decrease in one minutes. All asset can we see in figure 3.

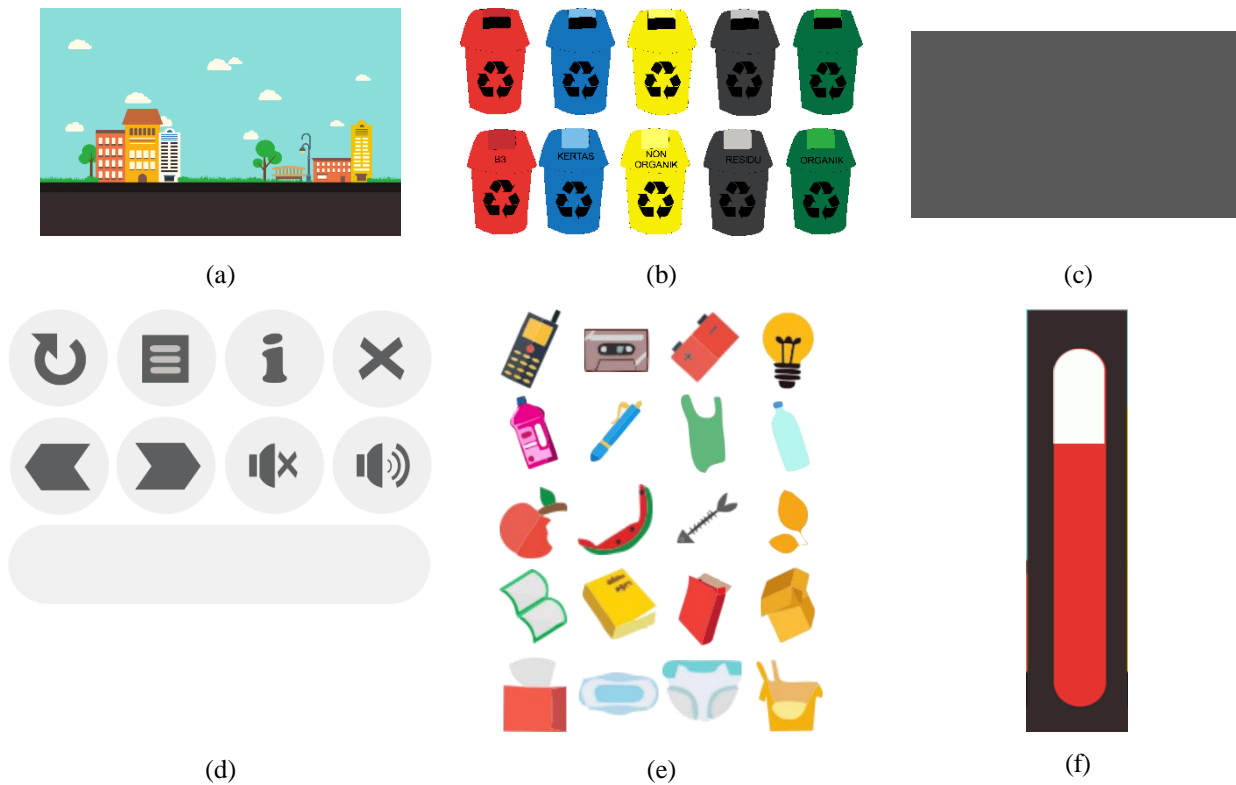


Figure 3. (a) Background; (b) Rubbish bin; (c) Background 2; (d) Button; (e) Kind of rubbish; (f) Time

3.2 The Application

3.2.1. Main Menu

In figure 4 can sees the full screen or full view of main menu. The main menu have design by memphish design that have powerful of color.

In figure 5 we can see the icon in the main menu. All button of the main menu it is information, sound and exit button. After that there are credits view. Exit view it mean that exit button pressed will make blank or closed the application. Then, menus for go to socialization, game, and management rubbish in the other menu or layout.



Figure 4. Main menu

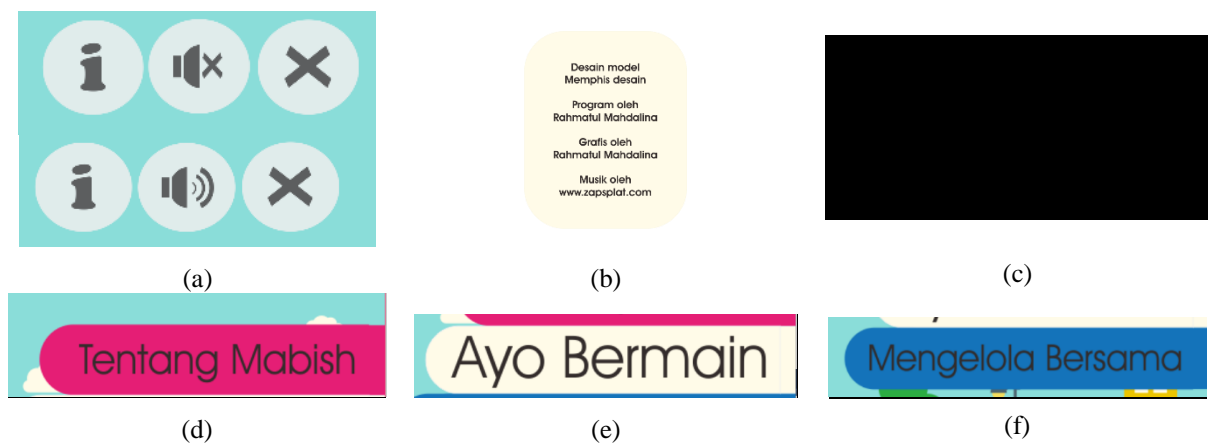


Figure 5. (a) Button credit, sound, and exit; (b) credit view; (c) Exit view; (d) First menu; (e) Second menu; (f) Third menu

3.2.2. First Menu (About Mabish)

In this menu have function for socialization of the rubbish from the government law, benefits of the application, the information type of rubbish bin and the rubbish. This menu also have simple button and easy to operation just by clicked next and back button. See in figure 6.

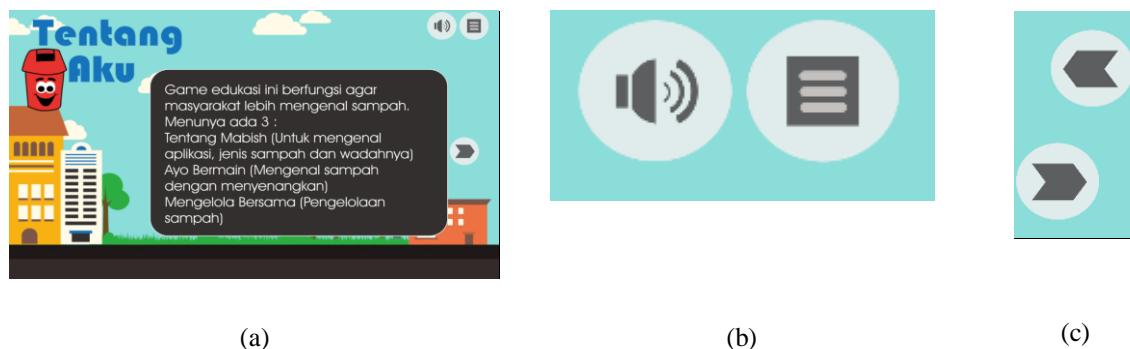


Figure 6. (a) About mabish views; (b) Button sound and menu; (c) Next, and Back button

3.2.3. Second Menu (Game)

Second menu of the application full of games. There are three games in Mabish application. In figure 7 can we see the full view of second menu that have many button start from help, reset, button to choose the game and play the game. The first game is throwing the rubbish to right rubbish bin. The second game is catch the rubbish that falling from the sky and it must be s synchronize by right rubbish bin. The third game is quiz game that choose multiple choice appropriate with the question. Then, background game over view that will turn up if incorrect play the game. The last is time's out view that turn up after one minute. All of game in the second menu are will be finished or closed in one minute.



Figure 7. (a) Game menus; (b) Putting rubbish game; (c) Falling rubbish game; (d) Quiz; (e) Game over view; (f) Time's up view

3.2.4. Third Menu (Manage the rubbish)

This menu can we see in figure 8 consist about video to manage the rubbish. In first view will be show instruction for play and paused the video in three seconds. About the video will be play in 01.30 seconds.



Figure 8. (a) Third menu view; (b) Video view

3.3 Testing

Black box testing is a type of testing that ignores the internal mechanism of a system or component and focuses solely on the outputs generated in response to the selected inputs and execution conditions (Bhasin, Khanna,& Sudha,2014). Black box testing is conducted to evaluate the compliance of a system with specified functional requirements and corresponding predicted results (Khan, 2011)

Tabel 3. Black box Test

Section	Tested	Input	Output	Status
Main Menu	Exit button	Click Exit button	Closed the application	Success
	Sound button	Click Sound button on/off	Sound on or muted	Success
	Credit button	Click Credit button	Displayed the credit	Success
	Menu button	Click menu button	Back to main menu	Success
	<i>Tentang Mabish</i> menu button	Click <i>Tentang Mabish</i> menu button	Go to <i>Tentang Mabish</i> menu button	Success
	<i>Ayo bermain</i> Mabish menu button	Click <i>Ayo bermain</i> Mabish menu button	Go to <i>Ayo bermain</i> Mabish menu	Success
	<i>Mengelola bersama</i> menu button	Click <i>Mengelola bersama</i> menu button	Go to <i>Mengelola bersama</i> menu	Success
<i>Tentang Mabish</i>	Sound button	Click Sound button on/off	Sound on or muted	Success
	Menu button	Click menu button	Back to main menu	Success
	Back or next button	Click back or next button	Slides the object	Success
<i>Ayo Bermain</i>	Sound button	Click Sound button on/off	Sound on or muted	Success
	Menu button	Click menu button	Back to main menu	Success
			Displayed the instruction for all game	Success
	<i>Petunjuk</i> button	Click <i>Petunjuk</i> button		
	<i>Reset Nilai</i> button	Click <i>Reset Nilai</i> button	Reset the score of all game	Success
	Back or next button	Click back or next button	Slides the game	Success
	Mainkan button	Click mainkan button	Choosed and play the game	Success
<i>Games</i>	Sound button	Click Sound button on/off	Sound on or muted	Success
	Menu button	Click menu button	Back to Ayo bermain menu	Success
	<i>Nilai</i> label	result for true or false object	The score event played	Success
	<i>Terbaik</i> label	Result the best score	The best score ever game played	Success
	Time icon	decrease for one minute	time's out for one minute	Success
	Drag-and-Drop object	Touch and drag the object	Follow direction the object dragged	Success
	Rubbish bin change	Rubbish bin draged	Change color every 10 seconds	Success
	Box question	showing the questions	Questions showing randomly	Success
	Boxs answer	showing the answer	Questions answer randomly	Success

Tabel 3. Black box Test

Section	Tested	Input	Output	Status
	Permainan selesai view	Showing the game over game	The game stopped	Success
	Time's out view	Showing the game time's out	The game stopped in one minute	Success
	Replay button	Click replay button	Played the last game	Success
<i>Mengelola Bersama</i>	Sound button	Click Sound button on/off	Sound on or muted	Success
	Menu button	Click menu button	Back to main menu	Success
	Direction layer	Showing direction	Showing direction for play video	Success
	Video object	Tap 1x on object	Played the video	Success
		Tap 2x on object	Paused the video	Success

3.4 Release

In this stage the Mabish have finished and tested by general society. Testing used Likert's scale like (Sugiyono,2015) said instrument by likert's scale will be used if the researcher want to measuring all of topic, opinion, and experiment. The game test was tested in SDIT Muhammadiyah Al- Kautsar Kartasura on April 02, 2018. The tester are 27 student of class III C and one teacher of curriculum. There are 7 statements and one suggestion for the game.

Statements :

1. Application overview interesting
2. Application easy to understand menu
3. The game running correctly
4. The Mabish game easy to play
5. The games in Mabish easy happily
6. The Mabish game increase my knowledge about rubbish
7. Mabish game led to pay attention about rubbish

Indicators:

- SS :*Sangat Setuju* (Strongly Agree)
 S :*Setuju* (Somewhat Agree)
 RR : *Ragu-Ragu* (Neutral)
 TS :*Tidak Setuju* (Somewhat Disagree)
 STS :*Sangat Tidak Setuju* (Strongly Disagree)

Result of questionnaire can countable by the formula equation 1.

$$Formula = \frac{\sum Score}{\sum Score Max} \times 100 \% \dots \dots \dots (1)$$

For count maximal score used formula equation 2.

$$Score Max = \sum Respondents \times 5 \dots \dots \dots (2)$$

Explanation: 5 get from SS value;

So, the Score max in this questionnaire is $27 \times 5 = 135$

Where is the student total is 27 students and can see in table 4. For the result of percentage in every statement is in table 4 too. Abridge people to understand there is graph from the result of questionnaire that see in figure 9.

Tabel 4. Questionnaire Result

Statements	Total Answer					Total Score	Percentage
	SS (5)	S (4)	N (3)	TS (2)	STS (1)		
P1	17	8	2	0	0	123	91%
P2	17	10	0	0	0	125	93%
P3	14	8	2	1	1	111	82%
P4	10	13	3	0	1	112	83%
P5	16	9	1	1	0	121	90%
P6	20	7	0	0	0	128	95%
P7	20	7	0	0	0	128	95%
Percentage Average							90%

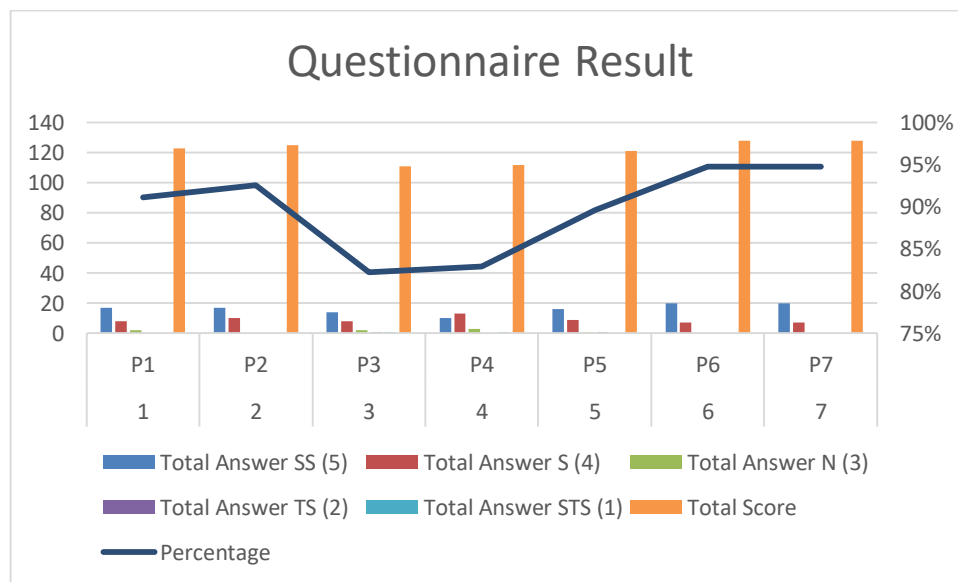


Figure 9. Questionnaire Result Graph

From the result and graph, statement one there is 91% total of respondents answer that means the overview of the mabish application is interesting. In second statement there are 93% total of respondents answer that means menu in the application easy to understand. The third statement there are 82% total of respondents answer that means game can be play and running correctly. The fourth statement there are 83% total of respondents answer that means the game in application is easy to play. The fifth statement there are 90% total of respondents answer that means all of the application from menu, games, and the video socialization are easy to operation and make the respondent happily when applied that. The sixth statement there are 95% total of

respondents answer that means the application increase the respondent knowledge especially about rubbish. The last statement there are 95% total of respondents answer that means the application make respondent pay attention about rubbish.

From the teacher all is good, the game educative and gratify. For the video there is suggestion to create more theoretical and showing before playing the game. The personal opinion and suggestion for the game can summarize that the game so interesting, the color good enough and suggestion student to throw the rubbish in the correct rubbish bin.

4. CONCLUSION

After testing process from black box test and respondent test by questionnaire, the conclusion are:

1. The function of menu in the game are running successfully over all. From the button, sound, video and all operation in the mabish application.
2. The mabish application have interesting overview, understanding menus, easy to play, increase the knowledge, make people more pay attention about rubbish and all of menu and function from the application is running correctly. The percentage average of application is 90% that means the mabish application accepted by respondent and can used for educational about rubbish also for socialized people about government law.

Suggestion for Mabish are increase the kind of game, and for video to manage the rubbish more effective, interest, and useful. The application amendable by make socialization the benefit of manage the rubbish, also the dangerous of management rubbish without knowing the type of rubbish. Other than the application can use animation or character mascot it can interaction with user. There are many law about rubbish and it is important to keep our environment be clean with our knowledge too. Manage the rubbish is the answer and application can useful, educative and interest to socialized that.

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